AN ANALYTICAL STUDY OF SUGARCANE INDUSTRY IN INDIA (WITH SPECIAL REFERENCE TO WESTERN UTTAR PRADESH)

Synopsis

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INTRODUCTION

Sugarcane has an incredibly long history of cultivation in the Indian sub-continent. If we look into the history a bit deeper, we find that the earliest reference to it is in the Atharva Veda (1500-800 BC), where sugarcane was called Ikshu and considered a source and symbol of sweet pleasant appearance. The word 'sugar' is derived from the ancient Sanskrit word “Sharkara”.

A Persian description from the 6th century BC gives the first account of solid sugar and describes it as coming from the Indus Valley. It is believed that Persian farmers discovered these Reeds that produced honey without bees approximately between the 6th and 4th Centuries in India.

Agriculture is one of the most significant sectors of the Indian Economy. Agriculture is the only means of living for almost two-thirds of the workers in India. The agriculture sector of India has occupied 43% of India’s geographical area, and is contributing 13.9 percent of India’s GDP. Agriculture still contributes significantly to India’s GDP despite a decline in its share in India’s GDP. There are many crops grown by farmers. These include different food crops, commercial crops, oil seeds, etc., sugarcane is one of the important commercial crops grown in India.

Sugarcane is mainly cultivated for sugar production in the world and is an important cash crop in India. It plays a key part in the upliftment of the socio-economic condition of the growers. Particularly in Uttar Pradesh, sugarcane not only supports the economy but has also dominated the farming system in this region for a long time. As an important cash crop of mid-western plain zone sugarcane occupies nearly 70 percent of cultivated land.

Present Status of the Sugar Industry in India

The Indian sugar industry is distributed in two main sectors i.e., organized and un-organized.

(i) The unorganized sector consists of GUR and Khand (Khand-sari) which is less refined sugar or raw sugar while

(ii) The organized sector consists of sugar factories and fine sugar.

One important fact is that India is the largest producer of traditional sweeteners like Khand and Gur.The rural Population of India is a major consumer of traditional sweeteners and accounts for approximately 37% of total sweetener consumption in India. In the 1930’s major part of sugarcane production, approximately 2/3rd is mostly used in the making of traditional

sweeteners.

Table No. 1.1: Number of Sugar Refineries and Factories in India

	Type of Sectors	Number of Refineries
1.	Co-operative	324
2.	Private	335
3.	Public	43
	Total	702*

* Includes closed sugar mills and refineries also
Source: DoFPD- Department of Food & Public Distribution,

In India Sugar Mills can be classified based on installed crushing capacity (Tonnes of Sugarcane Crushed per Day is TCD) into Five categories. The average crushing capacity in the country in 2013-14 was 3650 TCD in 136 days was the average crushing duration. In India, Approximately 11 Sugar Mills have higher than 10000 TCD capacity and approximately 104 Sugar Mills have less than 2001 TCD capacity.

Sugar and Sugarcane Production and Consumption in India

According to a study of agricultural statistics study conducted by Dept. of Agriculture and Cooperation Ministry 2013, concerning the domestic economy of sugarcane, the Uttar Pradesh is the major growing state which occupies approximately 43.68% area followed by Maharashtra with the area of 18.58%.

Similarly, The Uttar Pradesh contributes 39.78% and Maharashtra contributes 18.34% of production of Sugar. These two states have more than half the area and the production of sugarcane but Tamil Nadu ranks highest in terms of yield which is 92.6 tonnes per hectare. It is very interesting to know that Uttar Pradesh has more than double the area and production of sugarcane than Maharashtra but the share of production of sugar in Maharashtra is 34.09 percent while the share of Uttar Pradesh is 26.47 Percent in 2011-12. According to the Agricultural Statistics, the total sugarcane production area in 2013-2014 is 50.12 lakh hector, and total sugarcane production is 3500.2 lakh metric tonnes. The total production of sugar in India in 2013-14 is 250.0 lakh metric tonnes.

According to the Department of Food & Public Distribution, sugar consumption in 2013-14 was 230.00 lakh Metric tonnes and estimated 235.0 lakh Metric tonnes in 2013-14. According to the India Sugar Mill Association Sugar production, in the current sugar season 2014-2015 is 42.25 lakh tons.

This is about 13.5 lakh tons more than the production in the last sugar season, up to the corresponding period, of 28.77 lakh tons.

Sugarcane and its Bio-Product

Sugar Industry is one of the most environmentally friendly industries because it is producing green power. Ethanol is produced from the by-product of the sugar industry example molasses which is used as a fuel in Brazil and Sweden in large quantities.

The main by-products of any sugar industry are -Bagasse, molasses and filter cake.

Scope in Ethanol production

Ethanol is considered to be one of the most suitable alternative blending, transportation fuel due to its better fuel quality and environmental benefits.

Impact of Covid-19 on Sugar Industry

The covid-19 had put unexpected pressure on the Sugar Industry. A few sugar mills produce and market hand sanitizer themselves, but most supply ethanol, extra neutral alcohol or ethyl alcohol to external sanitizer plants. 24 sugar mills in UP and 19 sugar mills in Maharashtra started producing hand sanitizers amidst the ongoing cane crushing season.

The **sugar exports** in the world sugar market had reduced due to lower demands caused by the restraints on social gatherings and outings. At the international and domestic levels, there was a fall in **sugar** prices too**.** Since the lockdown across the country, there has been a big decline in the demand for sugar. The lockdown has impacted at least 1 million tonnes of sugar consumption in the domestic market. According to rating agency ICRA, the lockdown due to the Covid-19 pandemic has adversely impacted the demand for sugar, due to which the minimum support price of sugar has come down from Rs. 32.5 per kg to Rs. 31 per kg February 2020. Despite it, some other problems arose due to covid 19 pandemic which is as follows-International sugar price reduction, Disruptions in supply chain management, Shortage of cheap labour availability, Low availability of Packaging material

Uttar Pradesh and Sugar Industry

Uttar Pradesh is the most populous state in India and has 16.4 percent population of the country. Based on geographical area Uttar Pradesh is the 4th largest state constituting 9.0 percent geographical area of the country. Uttar Pradesh has approximately 83 districts, 901 development blocks, and 112,804

inhabited villages. Uttar Pradesh has an agricultural economy and approximately 60% of the total population of the state directly depends on agriculture for their livelihood. Uttar Pradesh is the largest producer of sugarcane in the country and accounts for approximately 50 percent of the total area of sugarcane plantations. Uttar Pradesh contributes approximately 45 percent of the total production of sugarcane. So, Uttar Pradesh has excellent investment opportunities for the development of the sugar industry because the demand for sugar is increasing continuously all over the world. Uttar Pradesh has the potential to meet this increasing demand for sugar because In the State of Uttar Pradesh production cost is very low and climatic and soil conditions are quite favourable. One of the main reasons for increasing investment in the Uttar Pradesh sugar industry is that Uttar Pradesh belongs to one of the most fertile lands in India known as Doab Khetra which is an extremely fertile land between the rivers Ganga and Jamuna.

The Uttar Pradesh Government now also has set up a Research and Development Dept. The user guide of the Sugarcane Information System from the Department of Sugar Industries and Sugarcane Development Uttar Pradesh, Uttar Pradesh is the largest producer of sugarcane in the country, and the livelihood of about 3.0 million farmers depends upon sugarcane and their produce is consumed by the 125 sugar mills operating in the state. A total of about 3.0 million sugarcane farmers are members of the 168 cooperative sugarcane grower's societies and the sugarcane is supplied to mills through them. Uttar Pradesh Cane Department is the apex administrative body regulating policies and functions related to the sugarcane industry in the state.

It makes all the important decisions regarding prices, quantity, and quality of the product and overall supervises the sugarcane agencies.

Government Policy and Indian Sugar Industry

The India govt. policies at the central and state levels have played a major role in the development of the sugar Industry. The sugar industry and its economics, starting from the pricing to the production and distribution is highly regulated.

Regulation is starting from - The form of cane reservation area, Rate or price fixation, levy sugar obligation, the regulated release of free sale (non-levy sugar) and the trade policies, etc. The regulation policies ensure a fair price to sugar yield, reasonable profits to industry, and supply sugar to vulnerable

sections of society.

However, the process of regulation of sugar production also leads to distortions -As there is no market-driven relationship between sugar and sugarcane.

Sometimes Government regulations leads to subsidies to be paid to various stakeholders in the sugar industry such as sugarcane cultivators, sugar mills etc. Further, if there are surplus production of sugarcane then exports can be encouraged to prevent mills from accumulating sugar inventory by helping in the form of Export Essential Commodities Act 2020.

The Central Government also announce the minimum price for sugarcane which is directly influenced by several factors- The cost of cultivating sugarcane, Returns to farmers from other alternative crops, yield of sugar cane, etc.

Since 2009, the Statutory minimum price has been changed as Fair and Remunerative Price which now includes a reasonable margin to farmers of sugarcane on account of risk of profit and loss.

Fair and Remunerative Price is the minimum price that sugarcane farmers are legally guaranteed to a basic sugar recovery of 9.5%. State Governments however also fixed a State Advised Price which is generally higher.

Sugar mills are compelled to pay the statutory minimum price to the farmers irrespective of the market price.

According to commission for Agriculture Cost and Price in 2021-22 is 290 Rs. per quintal and State Advised Price is –

1. 280 Rs. per quintal in Uttar Pradesh,
2. 265 Rs. per quintal in Maharashtra, and
3. 225 Rs. per quintal in Tamil Nadu.

Fair Remunerative price (FRP) for sugarcane for the sugar season 2014-15 to be-

1. Rs 220 per quintal at a 9.5 % recovery level.

   Not only this Sugar Mills have to supply 10 percent of their production at a fixed rate of about 20 Rs. per kg as an obligation to the Government in the form of levy sugar to meet its requirement for public distribution to the household below the poverty line.

The government later supplied the same amount of sugar to the below-poverty line people via ration

shop at 13.50 Rs. per kg. In May 2013, the government decontrolled the Indian sugar Industry by providing the freedom to sell their products in the open market. The obligation is being removed to supply sugar at subsidized rates for ration shops. The new mechanism seeks the state governments to procure sugar from the open market through a transparent system and provide the same to the people at the previous `13.50 per kg rate, which would double the government subsidy burden to `53 billion but at the same time would help the industry save about `30 billion crores per year. This move of the government is likely to bring in rapid consolidation in the industry with cost efficiency, size, and ability to manage price volatility. This will also help the mills to use the extra money they earn from free market sales to pay cane farmers and also chalk out bigger investment plans in the future.

Export and Import of Sugar in India

As per Foreign Agricultural Services data - India is the world's second largest producer of sugarcane and also the largest consumer of sugar in the world.

India's share in the international trade is always very small. It has been observed that when sugarcane production exceeds its consumption, stocks build up and the government removes all the regulations that suppress its exports and sometimes if needed has also provided export subsidies to boost export and reduce inventory.

Conversely, if consumption is moving ahead of production, then the government has removed all the import controls or reduced tariffs to facilitate sugar imports.

Example-

1. 2007-2008 was good production year exports were facilitated by the Directorate of Sugar, and the country exported 22.05% of production.

2. While In 2008-2009 and 2009-10, export was negligible due to a fall in production.

3. In the 2013-2014 season, domestic sugarcane prices showed a decline from Rs. 3150 per quintal to Rs. 2800 per quintal due to excess supply in the domestic market thus Subsidy for the sugar season 2013-2014 was fixed at Rs. 3333 per tonne of raw sugar that was exported due to the rising stock of white sugar.

According to the current Export-Import policy sugar exporting is free but it is mandatory to register the quantity of sugar with the Directorate General of Foreign Trade and permission of importing sugar

is at reasonable import duty of 15%.

WTO ruled against India's domestic support to sugarcane growers

Australia, Brazil, and Guatemala had taken India to the dispute settlement panel over disagreements over India's continuing extensive domestic support to the sugar and sugarcane industry. The countries had stated in 2019, that India's support to domestic producers was more than the limit of 10%, which was set by the global trade body, and that India's export subsidies to sugar mills were also prohibited. The report from the dispute settlement body found that India's subsidies to sugarcane producers exceeded the 10% limit as set by the WTO under the Articles on Agriculture, between 2014-2015 and 2018-2019. Additionally, India was found to be in contravention of the SCM Agreement and other articles within the AOA, through its various export schemes and subsidies for sugar mills like Production Assistance, the Buffer Stock, and Marketing and Transportation Schemes.

REVIEW OF LITERATURE

1. Singh.SC, Yadav. SP, Yadav.SK (Des 2018) examined that by utilizing the nutrient sources and microbial group sugarcane trashes can be composted in the field itself. SRS mixture and TNAU Bio mineralizer applied treatment produced high nitrogen value compost. The results of the study reveal that with the treatments T4 - TNAU bio-mineralizer 2kg t-1+ SRS mixture 100kg t-1 and T5- EM solution 2 lit t-1 +SRS mixture 100kg t-1. complete decomposition of sugarcane trashes was achieved within 60 days.

2. Jyothi (2014)-discusses the Government policies and their impacts on Sugar import and Export from India. The paper also throws light on the problems faced by the Sugar Industries and Farming community. The necessary steps to be taken for overcoming these problems are also hinted at in the paper.

3. Sangeeta and Jayanti (2014) -Explain that the sugar economy is highly regulated in India, starting from the sugarcane pricing to the final production and distribution of sugar. This study explains the role of subsidies in the Sugar Industry in India.

4. Mishra, Nilay, and Bani (2014) work on Bagasse Co-generation in India and concludes that support extended to bagasse co-generation by the MNRE, especially to cooperative sugar mills, must be continued. The preferential tariff determined by CERC and SERCs for the bagasse co-generation

must take into account the increased support price offered to sugarcane by state governments as well as the price offered to bagasse by competing technologies like paper and pulp industries. Strong RPO compliance by power distribution companies and streamlining of the REC mechanism are required to attract industries, project developers, and investors to invest in renewable energy in the country.

5. Srivastava and Purwar (2007) believed that developing countries like India will be able to expand their exports of agricultural products. The decade of the 1990s witnessed two significant developments that have a profound impact on agricultural trade. The first development relates to the liberalization of economic policy as part of the economic reforms program initiated in 1991. The second development concerns the new international regime following the Uruguay Round agreement and the formation of WTO.

6. Bhite B.R. et al (2006) experimented with different sugarcane varieties for the post-harvest effect. Advancements in Agro genetic management techniques significantly increased the yield of sugarcane. However, the sugar recovery rates till today have not shown any significant improvements.

7. Virendra Kumar Gupta et al (2006) conducted a field experiment to examine the economics of seed sugarcane production as influenced by N and K fertilization during 2003-04 at Sugarcane Research Institute, Samastipur, Bihar, the researchers applied different doses of Nitrogen (N) and Potash (K) at the different interval (T) and found that 150 kg N and 60 kg K 20 per hectare were suitable doses for higher seed cane yield.

8. Shimla and Amani (2006) analyse the impact of price shocks in three input and output markets critical to ethanol: gasoline, corn, and sugar, and investigate the impact of these shocks on ethanol and related agricultural markets in the United States and Brazil.

9. S. Thangavelu and D. Subhadra (2005) explored the footsteps of sugarcane right from 1923 to 2003. The data was compiled from various sources and presented to give a conclusion

10. Pruthi (1995) studied the history of the sugar industry in India. The study focused on the history of sugar, and sugar making in ancient and medieval India, during the British period and after independence till 1992. The consolidated chronological write up backed by secondary data, which was collected from Government records and books. The study concluded with remarkable findings that the English trader brought sugarcane to Agra and Lucknow to meet the growing sugar needs of the British

Empire; the manufacturing of sugar was intensified by the East India Company; the dominance of small size units in the initial phase of the growth of the sugar industry and the existence of major regional differences in the size of sugar mills in India; and after the independence the growth of the sugar industry was adversely affected by a variety of factors such as control, cane price, quota, duty, and sugar politics.

11. Pawar P.P." et al (2005) examined the benefits of adopting new production technologies in sugarcane industries in Western Maharashtra. The investigators approached 270 sugarcane growers during 2002-03 to assess the degree of knowledge about the improved production technology of sugarcane farms. The survey revealed that 25 percent of the farmers were not aware of the techniques

12. Shankaraiah and Murthy (2005) HE examined some Agro-techniques for the sustenance of soil health and sugarcane production for the Cauvery command area of Karnataka. The investigators analysed the field experiments conducted over a decade from 1990 to 2000. The study revealed that neither the mineral fertilizers nor the organic sources exclusively could sustain sugarcane productivity. A judicious combination of both components was the potential tool for sustaining the productivity of soil and crop.

13. Powell and Schmitz (2005) examine the US Cotton and Sugar Subsidies Decisions in respect of WTO's Dispute Settlement System Rebalances the Agreement on Agriculture.

14. C.S. Poswal et al (2005) examined the constraints in adopting transfer technology on sugarcane production and also know the influence of farmers' knowledge level in the adoption of improved sugarcane technology. The farmers were selected based on the size of the holding.

15. Rao' (2005) has compared the performance of seven countries viz., Brazil, India, Thailand, Mexico, Australia, South Africa, and Argentina during the year 2002-04. The study revealed that India was the world's largest producer of all the sweetening agents (sugar, Gur, Khandsari) and has the largest number of sugar mills.

16. S. Thangavelu and D. Subhadra (2005) explored the footsteps of sugarcane right from 1923 to 2003. The data was compiled from various sources and presented to give the conclusion

17. Pawar P.P." et al (2005) examined the benefits of adopting improved production technology in sugarcane farms in Western Maharashtra. The investigators approached 270 sugarcane growers during

2002-03 to assess the degree of knowledge about the improved production technology of sugarcane farms. The survey revealed that 25 percent of the farmers were not aware of the techniques.

18. Achilles (2005) critically evaluated the German position on the EU reform proposal for the sugar market regime. The German government generally supports the EU reform proposal for the EU sugar market regime but warns that the proposed quota reduction might not be sufficient to meet the reduction requirement resulting from the ongoing WTO negotiations and the WTO panel decisions on EU sugar exports.

19. Pane et. Al. (2005) examined various processes and economics of refined sugar production followed by the Indian sugar industry and also attempted to explain the efficient manner of by-product utilization.

20. **Powell and Schmitz (2005)** examine the US Cotton and Sugar Subsidies Decisions in respect of WTO's Dispute Settlement System Rebalances the Agreement on Agriculture.

21. Jain (2003) presented a retrospective view of the Indian sugar industry and discussed the development of the industry during the plans, the industry`s contribution to the national economy, and other related aspects of development and research in the area of sugarcane.

22. Summer (1998) identifies the central cause for fluctuating sugar prices in the world market. He discusses the speculation of sugar production levels and import needs of certain countries in the European context.

23. M. Ramulu (1996), in his study, attempted to analyze the factors responsible for the cultivation of sugar-cane crops in Andhra Pradesh. According to him, price plays an important role in the selection of crops and the generation of marketed surplus.

24. **Saraogi (1996)** discussed the role of the sugar development fund in financing the buffer stocks and pointed out the drawbacks of the sugarcane pricing policy of the central and state governments.

25. **H. N. Patil and B. J. Hinge85 (1995)** attempted to find out the impact of the co-operative sugar industry on the living standards of farmers referring to the institutional infrastructure of cooperatives and the co-operative sugar industry confined to western Maharashtra.

26. H. R. Shinde, et, al., (1994) analysed the factors of employment, migration and

in the sugar industry. They emphasized the seasonally migrated labour of cooperative sugar industries.

27. **Kumar (1994)** analysed the working of the sugar industry and the state sugar corporation of Bihar state to explore the ways to improve the existing state of its working. He extensively discussed the development of the sugar industry in India and the problems relating to

financial, production, and marketing management.

28. Tyagarajan (1993) discussed various restrictions on the sugar industries such as procurement, pricing of sugarcane, and distribution of sugar and molasses.

Grover and Grewal (1991) examined the problems of the sugar industry in India with special reference to four selected sugar mills and 72 sugarcane growers during the period 1960-61 to1989-90. The main objectives were to study cane suppliers, and the related changes in production and price, and to identify the various price and non-price factors responsible for fluctuations.

30. Rao and Sadanandam (1985) examined the two major aspects related to sugar policy and its impact on the industry. First, the applied aspects of sugar over the past 40 years have been analytically studied along with the impact on the various groups involved, viz., the farmers, manufacturers, and consumers. Second an imperial assessment of the management's attitude towards the impact of government sugar policy.

31. Kumar (1980) Govt of India, New Delhi. A High-Level Committee on "The Cost Structure of the Sugar Industry studied the cost structure of the sugar industry and recommended the policy of partial decontrol restoration in 1980. An important recommendation of the committee is to fix the cost of levy sugar based on the Statutory Minimum Cane Price (SMP) without any linkage with the free sale of sugar or cane price paid.

NEED OF THE STUDY

A serious problem for the sugar industry in India has been its frequent instability. There has been the alteration of increases or decreases in production and prices over short periods, resulting in widespread difficulties for producers and consumers. Sugar production in India has fallen, as farmers over the years shifted to better-paying food crops. The ordinance takes effect in 1974 when the levy pricing of sugar has been a subject of controversy resulting in legal proceedings. There are broad areas of public intervention that regulate the sugar market in India. First, both the Central and the State Governments

set price support for sugar cane. The Central Government announces a price level, referred to as the statuary minimum price for sugar (SMP) raised by the State Government to account for differences notably in productivity and transportation cost which was replaced by the concept of Fair and Remunerative Price (FRP), which takes into account "reasonable margins" for growers of sugar cane at which sugar factories are legally required to pay farmers. Next is restrictions on sugar quantities to be sold in the market also impose on the sugar factories a so-called sugar levy, by which they are required to sell at below market price to the public distribution centres. This restriction has been removed by the central government in 2013. In addition, the government regulates sugar trade via export limitations and marketing restrictions. As Uttar Pradesh is one of the major sugarcane-growing states but the production of sugar is not enough because the sugar sector of Uttar Pradesh suffered from financial weakness, a lack of professionalism, an underdeveloped marketing system, lack of knowledge. Hence, the researcher wants to know the answers to the following questions what is the impact of the sugar industry on the economic and social condition of farmers of western U.P. and what is the Ethanol production by the sugar industry and its impact on millers and clean energy generation in western. Thus, the present study has been undertaken and entitled: **AN ANALYTICAL STUDY OF SUGARCANE INDUSTRY IN INDIA (WITH SPECIAL REFERENCE TO WESTERN UTTAR PRADESH**

OBJECTIVES

1. To study the present status of the sugar industry in Western Uttar Pradesh.

2. To study the impact of the Covid-19 pandemic on the Sugarcane industry and MSP.

3. To study the impact of Demand & supply of Ethanol on the sugar industry and clean energy generation.

4. To study the problems faced by the miller and cane farmers of Western U.P. in the sugarcane industry.

5. To give suggestions for the smooth functioning of the sugarcane industry in India.

HYPOTHESIS

Based on objectives, mentioned above the following null hypothesis has been taken by the researcher for the study:

1. Ho1 - There is no significant impact of the Sugar Industry (Millers) on the sugarcane farmers of western Uttar Pradesh.

2. H02 – There is no significant impact of Bio Products especially ethanol for green energy Generation in Western Uttar Pradesh.

In addition to the above-mentioned hypothesis, the researcher would like to reframe more hypothesis during the study as per the requirement of the study.

RESEARCH METHODOLOGY

Selection of Sample

For the selection of sample size, an organized and systematic methodology is obtained. The population of the study comprised sugarcane farmers and sugar mills owner or managing directors all over Western Uttar Pradesh. There are 125 working Sugar Mills in Uttar Pradesh out of which 70 sugar mills are in Western Uttar Pradesh. In Western Uttar Pradesh the total number of working Sugar Mills is 70 in which 17 sugar mills are belonging to the cooperative sector and the remaining are in the private sector. The selected sample size is 10% of the total population of sugar mills in western Uttar Pradesh and 50 sugarcane farmers are selected from the same geographical area of sugar mills. The total number of selected private-sector sugar mills is 5 (10% of 53 mills) and the cooperative sector is 2 (10% of 17 mills). A simple random sampling technique is used to gather data from the respondents (for the selection of sugar mills). There are 29 districts in western Uttar Pradesh. As per convenience and high availability of sugar mills in western Uttar Pradesh, the researcher has chosen 3 districts Meerut, Muzaffarnagar, and Saharanpur.

Collection of Data

This research is descriptive as well as exploratory. This study has been based on both primary and secondary data sources to obtain the objectives of the study.

(1) Primary Data

To collect the primary data, a self-structured questionnaire has been administrated to sample sugar mills and Sugarcane farmers in western Uttar Pradesh. The collection of Primary data will be based on interviews with experts related to the Cane Commissioner, Sugarcane Farmers, Sugar Mills Owners, District Cane, and Sugar Officers. To collect the required primary data, the following points have been

taken into consideration.

1. Selection of Sample

2. Sources of data Collection (Questionnaires and Interviews)

3. Field visit

4. Attending the meetings and Conferences.

Two sets of questionnaires will be prepared to collect detailed information for research work. The questionnaires are prepared for the following respondents -

1. Sugar Mills Owners / Managing Director

2. Sugarcane Farmers.

The first set is prepared for the sugar mills owner or managing directors of sugar factories. For collecting the data regarding the working and management of private and Cooperative sugar factories. Questionnaires contained information regarding the name, date of registration of sugar factories, the total number of members, Day-to-day problems of sugar factories, and management of the sugar factories. It also includes working and functioning of the sugar factories and alternative sources of income for sugar factories.

The second set of questionnaires will be prepared for the farmers of the Sugar factories. This questionnaire contains information regarding the name, address, annual income, and overall problems of sugarcane farmers. They have problems with the Income they are getting, problems with their health, problems with the education of their Childs, and problems regarding the services they are getting from the factories.

To know the working, functions, and problems of sugar factories the interview technique will be adopted. The district-level offices and commissioner of sugar factories will be interviewed. The researcher personally visited the selected sugar factories and collects the information by filling out the questionnaire. The researcher will observe the office records of these Cooperative sugar factories to get additional information that will not be covered by the questionnaire. The researcher will personally talk with the managing director and sugarcane farmers of the sugar factories and also with the government department.

Field visits-

The field visits will also be arranged to know the actual functions and various services rendered by the sample sugar factories and also to know the problems of sugarcane farmers.

(2) Secondary Data- The secondary data has been collected from concerned books, magazines, journals, news and papers, and other related literature and the reports of various government departments, for example- the Ministry of Home Affairs, Ministry of Agriculture, Department of Agriculture & Cooperation, Directorate Of Sugarcane Development**,** Ministry of rural development, U.P. Sugarcane Development Department and Department of Food and Public Distribution. To collect secondary data the researcher will also use the library facilities.

STATISTICAL TOOLS

For analysing the findings and drawing the inferences, statistical and mathematical tools will be used percentages, averages, Standard deviation, Z-test analysis, ANOVA, and other

Appropriate tools, etc. In addition to the above-mentioned tools, various other statistical tools can also be used as per the requirement of the study. Software such as E- Views and SPSS will be used for the data analysis.

Table No. 2.1 Research Plan

PARTICULARS	**DESCRIPTION**	
Research Area	Sugar Industry	
Geographical area	Western Uttar Pradesh	
Research type	Descriptive, Analytical and Exploratory	
Sampling Technique	Simple Random Sampling for selection of sugar Mills and Convenient Sampling for selection of Cane farmers.	
Total Sugar mills in Uttar Pradesh (working)	125	
Total Sugar Mills in Western U.P.	70	
Total number of sugar mill sector wise in Western Uttar Pradesh	Private Sector: 53 Sugar Mills Cooperative Sector: 17 Sugar Mills	
Sample size	Sugarcane Mill Owner/ Managing Director	07
	Sugarcane Farmers	350
	Total respondent	357
Method of data collection	Survey method (self-structured ,questionnaire Schedule and Interview).	
Statistical and analytical tools	Z Test, ratio, percentage, Anova,Five-point Likert scale, chi square test and other Appropriate statistical measures and tools.	

Proposed Chapterisation:

The Study will be divided in the following chapters-

1. Introduction

a) Background

b) Need of Study

c) Objective of Study

d) Research Methodology

2.Review of Literature

3. Present status of Sugar Industry in India

4. Role of Ethanol in sustainable development

5. Impact of Covid-19 pandemic on Minimum Support Price (MSP) and Sugar industry

6. Analysis and findings

7. Conclusion & Recommendation.

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